Care and Handling of Surgical and Endoscopic Instruments

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Surgical instruments represent a major dollar investment for a facility. As such, this investment must be properly cared for and maintained for optimum usage and patient safety.

The first "rule" is to always obtain and follow the instrument/device manufacturer's written instructions for cleaning, packaging and sterilization. This information should be verified each time a new device is received. Without this information, device/instrument can be damaged or not properly cleaned. Exposure of metals to incompatible solutions can cause a chemical and electrochemical attack called corrosion which may be irreversible. Liquids, especially chlorides (e.g. bleach) are of concern for stainless steel therefore, surgical instruments should never be exposed to bleach. If exposure to saline cannot be avoided, then the instrument should immediately be rinsed off with sterile water.

Damage to Instruments – The life of an instrument should last about twenty years if cared for properly. There are many causes of damage which include:

Misuse - not used as intended by design
Abuse – (e.g.) dumping instruments, stacking
Improper cleaning, sterilization
Exposure to chemicals/detergents (e.g. saline - chlorine bleach, blood even water!)

Stainless steel will corrode and when it does, the corrosion usually appears as surface blemishes (roughness / rust). This creates difficulties for cleaning, disinfection and sterilization. Corrosion can also indicate locations where future device failure can occur. Stainless steel can corrode by pitting, crevice corrosion and stress corrosion cracking (SCC) (also known as hydrogen cracking). This is usually caused by exposure to blood, chloride or bromide containing solutions. The effect is deep "pockets" or pits which look like black holes on the surface. When pitting occurs, this cannot be repaired, the instrument must be replaced.

Corrosion is often found in box locks and other joints of instruments. Sometimes this appears as a red rust. The cause is usually blood and/or other soils in the joint and box lock. Any type of corrosion interferes with proper cleaning and can inhibit the disinfection/sterilization process. Therefore, it is important to carefully inspect instruments for corrosion. A major factor in corrosion is improper cleaning.

Water Quality - The quality of water can have great impact on instrument life. It is recommended to have your water analyzed. This should be done by your detergent manufacturer at no charge. Mot water supplies have minerals such as sodium, magnesium and iron present. All of these can adversely affect cleaning as well as detergent action impacting on the life of instrument.

How to Protect Instruments – Instruments should only be used as intended. *For example,* only use dissecting scissors on tissue, only use suture scissors to cut suture, never use tubing clamps to clamp tubings, never "dump"

instruments from tray. Always keep instruments as clean as possible while in use. At end of the procedure, place the instruments in their specific container. If this is a protective container, place the items in the designated location to protect instruments from damage in transport. Instruments should not be stacked unless they are in a rigid container.

Protect delicate items and items with fine/sharp tips by using tip protectors. Before using a tip protector, get the manufacturer's technical data verifying the tip protectors will permit penetration of the sterilant (steam, ETO, gas plasma, etc.). Always place heavier items on the bottom of the set and lighter items on top. It is important to separate scopes from instruments to avoid damage to scopes.

The use of specialty containers helps to keep delicate items in place before and after use. Purchase of delicate instruments should always include a specialty container to avoid unnecessary damage.

Competencies - All individuals handling surgical instruments and devices need to be knowledgeable in the care, handling and processing of surgical instruments. Surgical instruments are the extension of the surgeon's hands therefore, they must be functional when used in the OR. Scissors should be tested for sharpness each time they are processed. Ratchets should be checked for tension. Finger forceps should be checked to make sure the tips meet (approximate) and that teeth are present if indicated.

Quality Control – All instruments should be inspected using a lighted magnifying lamp. The device should be inspected for cleanliness, to make sure all components are present, that the instrument works as intended, that there is no damage to the instrument and that the instrument is the one identified for the set (correct instrument.)

Scopes -There are two categories of scopes; rigid and flexible. The flexible scopes are mainly used in GI/Endo (e.g. gastroscopes). The rigid scopes include arthroscopes, cystoscopes, etc. This instrumentation is very expensive. Cleaning is paramount to the safety of the device yet by design many of these devices defy cleaning. Therefore compliance with the device manufacturer's written instructions is critical.

All personnel processing endoscopic instrumentation should be trained and competencies verified.

Rigid Scopes are a critical part of the endoscopic surgery instrument inventory. They are fragile and expensive. They provide light and image to the surgeon therefore, they must function as expected. The smaller the diameter of the scope, usually the more fragile therefore careful handling is essential to avoid damage to the small glass rods that transmit the light.

Always follow the scope manufacturer's instructions for cleaning. Usually it is recommended to brush the distal end with soft bristle brush and then wipe the outer surfaces of the scope and accessories with gauze or soft cloth moistened with detergent solution. However, this may vary with the manufacturer. Ultrasonic cleaning is not usually recommended for scopes; the vibrations can damage the lens seals and possibly fracture the optical fibers.

All areas of the scope should be inspected for scratches, dents, burns, etc. Each time the scope is processed, it should be inspected for image clarity. The image should be crisp, clear. However, if the image is cloudy, discolored or hazy, this may be caused by improper cleaning, disinfectant residue, cracked or broken lens, presence of internal moisture or external damage to the shaft. Rigid scopes should be stored in specialty

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containers to prevent damage; there are also protective sleeves to place over the shaft to prevent damage as well. Verify with the cope manufacturer if these sleeves can remain on during the sterilization process.

Today two companies manufacture rigid scope testers to identify issues with rigid scopes before processing. They are very effective in identifying scope problems.

Light Cables - Fiber optic light cables also require special handling. They should be cleaned per the manufacturer's instructions using only those detergents recommended. When preparing for sterilization, the cables should be **loosely** coiled (no less than 8-inches in diameter) to prevent damage to the glass rods.

Laparoscopic Instrumentation - provides unique challenges for processing due to the design. This instrumentation can be extremely difficult to clean due to the design (long shaft) and jaw assembly. Both areas can trap debris. During surgery, the positive pressure of the insufflated abdomen can cause blood and body fluids to flow under insulation and into channels making cleaning difficult/impossible. Disassemble (if recommended by the manufacturer). The use of enzymatic cleaner Alas soon as possible after surgery is recommended. Many endoscopic instrument manufacturers recommend the use of an ultrasonic cleaner (however, follow the instrument manufacturers recommendations for cleaning). Pay special attention to jaws and channels.

For laparoscopic instruments, there are some newer technologies to help with cleaning. Several manufacturers offer high pressure water jets for lumens as an alternative to manually brushing and flushing. It is important to rinse repeatedly to remove all detergents and residues from the instruments. There are also table-top ultrasonic lumen cleaners which adapt to the lumens of endoscopic instruments to enhance cleaning.

Inspection - Insulated instruments require special inspection. There is a patient safety issue associated with insulated instruments. Repeated use/sterilization can cause the layer of insulation covering the shaft to break down. If this occurs, minute tears can go unnoticed during cleaning/inspection. During surgery the defective insulation could allow 100% of the electrical current (700^{o}F) to flow from the defect to the patient's organs, tissue. What is even more important to note is that the smaller the crack the more dangerous to the patient because more current can escape from a small hole because it is more concentrated. Furthermore, a majority of the instrument is outside the surgeon's visual field and therefore the defect could go unnoticed. The patient may suffer peritonitis and even death from septicemia (infection of the blood steam; also called blood poisoning).

Damage to the insulation will occur due to normal wear and tear, high voltages, the cleaning and sterilization process (flash sterilization increases damage) and contact with sharp instruments (e.g. trocars). Therefore, it is imperative that a comprehensive system for inspection of insulation be implemented. This inspection should occur each time the instrument is processed. The inspection can be done by using an insulation tester in the processing area (reusable device) or a single use tester that is sterile and used in the sterile field prior to surgery.

The insulation can get damaged from dropping the instrument, repeated sterilizations and/or placing instruments on top of other instruments, or "dumped" into a table; therefore proper care and handling of these instruments is essential to patient safety.

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Trocars – *If reusable trocars are being used, they must be tested for sharpness each time. Identify the maximum number of uses that would indicate re-sharpening. Observe for nicks, defects which would interfere with passage of the scope.*

Conclusion - Surgical instruments represent a high dollar investment. All personnel handling instruments must protect them from abuse and damage. The instrumentation must be in the correct condition and function as expected during the surgical procedure to enhance patient safety. We must remember that surgical instruments are extensions of the surgeon's hands. Therefore, proper use, handling, cleaning, sterilization and maintenance is essential. Everyone handling instruments needs to know how to care for instruments properly.

Identify qualified repair services for all scopes and instruments to make sure your investment is not damaged! Always follow the device manufacturer's instructions for cleaning, inspection and testing and handle all instruments with extreme care. Carefully inspect insulated instruments each and every time.

Today, 80% of the surgical procedures are being performed endoscopically. Therefore it is essential to have a quality process in place to ensure proper cleaning, functionality and sterilization. Our patients deserve no less.

References:

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JARIT Surgical and Endoscopic Instruments catalog.

McGan Insulation Tester User manual.

Spectrum Surgical Instruments, Care and Handling of Instruments.

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POST TEST QUESTIONS: Care and Handling of Surgical and Endoscopic Instruments

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1. If properly care for, quality surgical instruments should last how many years?

   A) 5
   B) 10
   C) 15
   D) 20

2. The top three reasons instruments get damaged are:

   A) misuse, thrown out, abuse
   B) misuse, abuse, exposure to chemicals/detergents
   C) exposure to detergents/chemicals, misuse, packaged incorrectly
   D) abuse, misuse, packaged incorrectly

3. Exposure of metals to incompatible solutions can cause a chemical and electrochemical attack known as:

   A) staining
   B) electrolysis
   C) oxidation
   D) corrosion

4. Which of the following chemicals is the most corrosive to surgical instruments?

   A) Bleach
   B) Sterile water
   C) Enzyme detergents
   D) Isopropyl alcohol

5. Corrosion is usually found on which part of the surgical instrument?

   A) Shanks
   B) Finger rings
   C) Box lock
   D) Jaws

6. Surgical instrument sets should never be:

   A) soaked in enzyme detergents
   B) dumped onto a table
   C) lubricated
   D) cleaned with neutral pH detergents

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7. The integrity of insulated instruments should be tested

   A) each time they are processed
   B) weekly
   C) monthly
   D) twice a year

8. A major safety concern of failed insulation is:

   A) fire
   B) smoke
   C) patient/surgeon injury
   D) damaged instrument

9. When preparing fiber optic cables they should be coiled no less than

   A) 6 in diameter
   B) 8 in diameter
   C) 10 in diameter
   D) 12 in diameter

10. Ultrasonic cleaning of rigid scopes is usually not recommended because

    A) the scopes do not fit inside the chamber
    B) the detergent can damage the scopes
    C) the vibrations can damage the scope
    D) they can be cleaned in a washer/disinfector

Payment Directions on next page.....

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If you have any questions, please email heidi@spdceus.com
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